

CLAIMS

We claim:

1 1. A method for post-etch treatment of a semiconductor structure following a dielectric  
2 etch process, wherein said semiconductor structure includes an overlying dielectric layer into  
3 which openings have been etched, wherein the method comprises exposing said  
4 semiconductor structure to a plasma generated from a source gas comprising oxygen, a  
5 nitrogen-comprising gas, and a reactive gas comprising hydrogen, carbon, and fluorine.

1 2. The method of Claim 1, wherein said reactive gas comprises at least one hydrogen-  
2 containing fluorocarbon gas.

1 3. The method of Claim 2, wherein said hydrogen-containing fluorocarbon gas is  
2 selected from the group consisting of  $\text{CHF}_3$ ,  $\text{CH}_2\text{F}_2$ ,  $\text{CH}_3\text{F}$ ,  $\text{C}_3\text{H}_2\text{F}_6$ , and combinations  
3 thereof.

1 4. The method of Claim 1, wherein said reactive gas comprises at least one  
2 fluorocarbon gas and hydrogen.

1 5. The method of Claim 4, wherein said fluorocarbon gas is selected from the group  
2 consisting of  $\text{C}_2\text{F}_6$ ,  $\text{C}_3\text{F}_6$ ,  $\text{C}_3\text{F}_8$ ,  $\text{C}_4\text{F}_6$ ,  $\text{C}_4\text{F}_8$ , and combinations thereof.

1 6. The method of Claim 1 or Claim 2, or Claim 4, wherein said nitrogen-comprising  
2 gas is  $\text{N}_2$ .

7. The method of Claim 1, wherein said method further comprises a flushing step performed prior to said post-etch treatment.

8. The method of Claim 7, wherein said flushing step comprises exposing said semiconductor structure to a high-flow plasma comprising oxygen.

9. The method of Claim 1 or Claim 8, wherein said method further comprises a cleaning step subsequent to said post-etch treatment.

10. The method of Claim 9, wherein said cleaning step is performed while said semiconductor structure is present in said process chamber.

11. The method of Claim 1, wherein said cleaning step is performed after said semiconductor structure is removed from said process chamber.

12. The method of Claim 1, wherein said post-etch treatment method removes a photoresist layer overlying said dielectric layer.

13. A method of post-etch treatment of a semiconductor structure following a dielectric etch process, wherein said semiconductor structure includes an overlying dielectric layer into which openings have been etched, wherein the method comprises the steps of:

a) a flushing step comprising exposing said semiconductor structure to a high-flow plasma comprising oxygen;

b) a post-etch treatment step comprising exposing said semiconductor structure to a plasma generated from a source gas comprising oxygen, a nitrogen-comprising gas, and a reactive gas comprising hydrogen, carbon, and fluorine; and

1 c) a cleaning step comprising exposing at least a process chamber in which said  
2 dielectric etch process was performed to a medium-flow plasma comprising oxygen.

1 14. The method of Claim 13, wherein said reactive gas comprises at least one hydrogen-  
2 containing fluorocarbon gas.

1 15. The method of Claim 14, wherein said hydrogen-containing fluorocarbon gas is  
2 selected from the group consisting of  $\text{CHF}_3$ ,  $\text{CH}_2\text{F}_2$ ,  $\text{CH}_3\text{F}$ ,  $\text{C}_3\text{H}_2\text{F}_6$ , and combinations  
3 thereof.

1 16. The method of Claim 13, wherein said reactive gas comprises at least one  
2 fluorocarbon gas and hydrogen.

1 17. The method of Claim 16, wherein said fluorocarbon gas is selected from the group  
2 consisting of  $\text{C}_2\text{F}_6$ ,  $\text{C}_3\text{F}_8$ ,  $\text{C}_4\text{F}_6$ ,  $\text{C}_4\text{F}_8$ , and combinations thereof.

1 18. The method of Claim 13, wherein said nitrogen-comprising gas is  $\text{N}_2$ .

1 19. A controller apparatus programmed to carry out the method of Claim 1 or Claim 13.

1 20. A medium containing data which enables a controller apparatus to carry out the  
2 method of Claim 1 or Claim 13.